[This question paper contains 16 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 8591 **J**

Unique Paper Code : 32341101

Name of the Paper : Programming Fundamentals using C++

Name of the Course : **B.Sc. (H) Computer Science**

Semester : I

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question **1** is compulsory in **Section A**.
3. Attempt any **four** questions from **Section B**.
4. Parts of a question should be attempted together.

SECTION A

1. (a) Consider the following declaration statements :

```
float  f;
int  *b  =  &f;
```

P.T.O.

Identify the error and write the code to correct it. (2)

(b) Assuming that the required header files have been included where required, what will be the output produced on execution of the following code segments :

(i)
```
double  z1;
double  y  =  56.7;
int  x  =  34;
if(x)
{
    z1  =  y++;
    cout<<z1<<"\n"<<y;
}
else
{
    z1  =  y+x/2;
    cout<<z1<<y;
}
```
(2)

(ii)
```
int  x  =  4,  y  =  3;
for(int  i  =  1;i<=x;  i++)
{
   for(int  j  =  y;  j>=1;j-)
     cout<<(i*j);
   cout<<"\n";
}
```
(4)

(iii)
```
int  v;
int  k  =  10;
v  =  (150%k  ?  k+5:  ++k);
cout<<"v="  <<v  <<"k="  <<k;
```
(2)

(iv)
```
int  i;
int  b[]={101,120,130,-340,-112,
-114};
for  (i  =  0;  b[i]>0;  i++)
;
cout  <<i;
```
(2)

(v)
```
int  i  =  890;
double  x  =  4.678;
cout<<setw(5)<<i<<"\n";
cout<<fixed;
cout<<setprecision(6);
cout<<"x="<<x<<"\n";
cout<<oct<<"Octal="<<i;
```
(4)

(vi)
```
string  s("The  basic  program
of  C  plus  plus");
int  j;
int  k=0;
int  count=0;
j  =  s.find('u',k);
```

```
while(j!=-1)
{
   count++;
   j  =  s.find('u',j+1);
}

cout<<count;
```

(4)

(vii)

```
class  Base
{
  public:
  Base()
  {
     cout<<"Inside  Base\n";
  }
};
class  Derived1:  public  Base
{
  public:
  Derived1()
  {
     cout<<"Inside  Derived1\n";
  }
};
```

```
class Derived2 : public Derived1
{
  public:
  Derived2()
  {
     cout<<"Inside Derived 2\n";
  }
};
void  main()
{
     Base  o1;
     Derived1  o2;
     Derived2  o3;
}
```

(3)

(c) Assuming that the required header files have been included where required, Find out the error in the following code fragments

(i)
```
void  f(int  *p)
{
   int  a;
   *p  =  a;
   *a  =  *a+1;
   return  a;
}
```

(3)

(ii)
```
void try(int a,int b)
{
    if(a<0) throws "Negative
    number";
}
```
(1)

(d) Write a function to remove duplicate element from one dimensional integer array A of size n. (5)

(e) Rewrite the following while statement as an equivalent for statement :

```
int x = 0;
while(x<10)
{
   cout<<x<<endl;
   x++;
}
```
(3)

SECTION B

2. (a) Write a program to count the number of vowels in a string entered as command line argument. (3)

(b) Consider four integer variables that has been initialized as : `y = 5, z = 0` and `t = -4`. What is the value of each of the following expressions on evaluation (consider each part independent of other)?

(i) `t || z <(y+5) && y`

(ii) `3*y/4%5&&y`

(iii) `!(4+5*y>=z-4)&&(z-2)` (3)

(c) Write a C++ function that takes an array of characters to convert all lowercase characters to uppercase (without using *built-in* functions) and return type is void. (4)

3. (a) What will be the output produced on execution of the following code segment :

```
#include<iostream>
using namespace std;
void main()
{
   int i;
   int j = 11;
   int m = 6;
for(int i = 1;i<=m; i++)
```

```
    {
       for(int  t=1; t<=j;  t++)
         cout<<t;
       j  =  j-2;
       cout<<"\n";
    }
}
```

(5)

(b) Write a function `UpperTriangular()` that accept a matrix A of order n*n as an input argument as well as its order. The function should convert matrix A to uppertriangular matrix by assigning 0 to all elements below principal diagonal(diagonal left to right from top). (5)

4. (a) Consider the following class :

```
class  Rationalnumber
{
    int  p,q;
    ...
};
```

The above class is designed to define a rational number with numerator p and denominator q. For the above class write the definitions of the following member functions :

(i) Parameterized constructor

(ii) Overload + operator to add two rational numbers

(iii) Display function

Write the suitable statements to create three rational numbers r1, r2 & r3 having 5/7, 6/7 and 8/7. Use operator overloading to store the sum of two objects in third object r3. Use the display function to print the content of object r1, r2 and r3. (6)

(b) Write a program that reads a file and print the number of lines in it. (4)

5. (a) What will be the output produced on execution of the following code segment :

```
#include<iostream>
using namespace std;
void main()
{
  int arr[]={12,34,56,89};
  int temp;
  int size = 4;
  for(int i=0,j=size-1;i<j; i++,j--)
    {
```

```
            temp = arr[i];
            arr[i] = arr[j];
            arr[j] = temp;
        }
    for(int i = 0;i<size;i++)
        cout<<arr[i]<<"\n";
}
```

(b) Consider a following class :

```
class X
{
    int i1;
 public:
 X()
 {
   i1 = 15;
 }
 virtual void display()
 {
   cout<<"i1="<<i1<<endl;
 }
 };
class Y :public X
{
 int j1;
```

```
  public:
  Y()
  {
    j1 = 10;
  }
...
};
class Z:public Y
{
  int k1;
  public:
  Z()
  {
    k1 = 20;
  }
  ...
};
```

Replace ellipses ... by appropriate C++ code to override method `display()` in class `Y` and `Z`. Use Runtime polymorphism to display the content of objects of class `X`, `Y` and `Z`. (6)

6. (a) Consider the following declarations:

```
string s1 = "Hello World";
string s2 = "Program in C++";
```

Write code fragments for the following :

(i) To compare the first four characters s1 with the last two characters of s2

(ii) To extract the last six characters of s

(b) Write the output on execution of the followi code :

```
#include<iostream>
using namespace std;
 class myexception
   {
     string str;
     public:
     myexception(string p)
     {
       str=p;
     }
     void display()
     {
       cout<<str;
     }
```

```
    };
void  main()
{
    int  n,m;
  try
  {
    n  =  5;
    m  =  -6;
    if  (n<0)
      throw  myexception("Negative
      number");
    cout<<n<<endl;
    if  (m<0)
      throw  myexception("Negative
      number");
    cout<<m;
  }
 catch(myexception  o1)
 {
    o1.display();
 }
}
```

(5)

7. (a) Identify an error in the following code and giv reasons for the same :

(i)
```
#include <iostream>
using namespace std;
class US1
{
  int p;
  protected:
  int q;
  public :
  int r;
};
class US2: public US1
{
  protected:
  float s,u;
};
void main()
{
  US1 o1;
  US2 o2;
  cout<<o1.p;
```

```
        cout<<o1.q;
        cout<<o1.r;
        cout<<o2.p;
        cout<<o2.q;
        cout<<o2.r;
        cout<<o2.s;
        cout<<o2.u;
    }
```

(3)

(ii)
```
do
    {
      int  ctr=0;
      cout<<ctr;
      ctr++;
    }while(ctr!=10);
```

(2)

(iii)
```
void  f(  int  n  )
    {
      if  (n==0)  return  1;
    }
```

(1)

(b) Write C++ declarations for the following :

(2+2)

(i) A function that accepts an array o integers, a character variable an returning a pointer to an integer.

(ii) print integer x with field width as 10 an fill character as '*'.

This question paper contains 4 printed pages.

Your Roll No. .....

Sl. No. of Ques. Paper : **8611** **J**

Unique Paper Code : **32341102**

Name of Paper : **Computer System Architecture**

Name of Course : **B.Sc. (Hons.) Computer Science**

Semester : **I**

Duration : **3 hours**

Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

*Attempt any **four** of Question Nos. 2 to 7.*

Parts of a question should be answered together.

1. (a) Give characteristic table and excitation table of SR flip-flop. What is the limitation of SR flipflop? 2+2+1

   (b) Given the Boolean expression F = x'y + xyz'. Derive an algebraic expression for the complement F'. 2

   (c) Convert the following numbers with the indicated bases to decimal :

   $(12121)_3, (4310)_5, (198)_{12}$ 3×2=6

   (d) What are the two instructions needed in the basic computer in order to set the E flip-flop to 1? 2

   (e) Draw the block diagram of a 4-to-1 line multiplexer and explain its operation by means of a function table. 4

P.T.O.

(f) What is SIMD class of parallel computers? Where do they find usage? 2

(g) What mechanism can be used to detect overflow condition while performing arithmetic computations on binary numbers? Give one example. 1+2

(h) In general register organization of a computer, specify the 14-bit binary control word format consisting of the fields SELA, SELB, SELD of 3 bits each, for selecting registers and OPR. Using this control word implement following micro-operation :

$$R1 \leftarrow (R1 - R2)$$

where binary code of OPR is 00011.code for selecting the register that corresponds to the register numbers. 3

(i) Draw a space-time diagram for a six-segment pipeline showing the time it takes to process eight tasks. 4

(j) Describe the sequence of micro-operations and give a flow chart showing register transfer statements for Fetch and Decode phases of instruction cycle of a typical CPU. 4

2. (a) Simplify the Boolean function F together with the don't-care conditions *d* in sum of products form :

$$F(w, x, y, z) = \Sigma(0, 1, 2, 3, 7, 8, 10)$$

$$d(w, x, y, z) = \Sigma(5, 6, 11, 15)$$ 6

(b) What is the register addressing mode? What is register indirect mode? What is the benefit of using register indirect mode? 2

(c) What is the base register addressing mode? What is its significance? 2

3. (a) A two word instruction is stored at locations 300 and 301. The instruction has a mode bit and opcode "load to AC" with its address field at location 301. The address field has the value 400. A processor register R1 contains the number 600. The index register XR contains the number 100. Evaluate the effective address if the addressing mode of the instruction is :

(i) Direct

(ii) Immediate

(iii) Relative

(iv) Register indirect

(v) Indexed addressing mode with XR as the index register. 5

(b) Write micro-operations for following instructions :

(i) ADD

(ii) ISZ

(iii) CLA 2+2+1=5

4. (a) The following memory units are specified by the number of words times the number of bits per word. How many address lines and input-output data lines are needed in each case?

(i) 61k × 8

(ii) 16M × 32 2+2=4

(b) Give the truth table of a 3-to-8 line decoder. Draw the logic diagram of the same. 6

5. (a) Convert the hexadecimal F3A7C2 to binary and octal. 2

(b) Perform the arithmetic operations (+42)+(−13) and (−42)−(−13) in binary using signed-2's complement representation for negative numbers. 2+2=4

(c) A non-pipeline system takes 50 ns to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of 10 ns. Determine the speedup ratio of the pipeline for 100 tasks. What is the maximum speedup that can be achieved? 2+2=4

6. (a) A computer uses a memory unit with 256K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part.

(i) How many bits are there in the operation code, the register code part and the address part?

(ii) Draw the instruction word format and indicate the number of bits in each part.

(iii) How many bits are there in the data and address inputs of the memory? 6

(b) Write a program to evaluate following arithmetic expression:

$$X = (C - D)*(E - F)$$ 4

using a general register organization computer with two address instructions. 4

7. (a) What is Isolated I/O? Mention its two advantages and two disadvantages. 1+2+2

(b) Explain Direct Memory Access (DMA) technique with the help of block diagram. 5

[This question paper contains 7 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7403** **J**

Unique Paper Code : 32341301

Name of the Course : **B.Sc.(Hons.) Computer Science**

Name of the Paper : Data Structures

Semester : III

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Question No. **1** is compulsory.

(c) Attempt any **four** questions out of the remaining Question No. **2** to **7**.

(d) Parts of a question must be answered together.

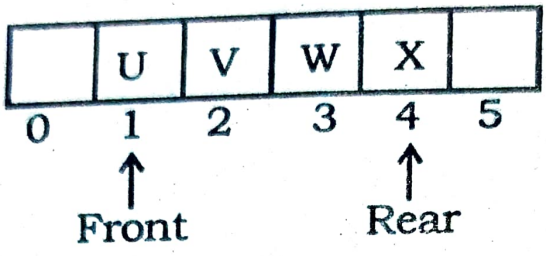
1. (a) Convert the following infix expression to postfix form using a stack : 5

(A – B / C) * (D * E – F)

Show the contents of the stack at every step.

P.T.O.

(b) Consider the following Queue of characters of size 6 : 5



This Queue is implemented as a circular array. Show the contents of the Queue with the positions of Front and Rear after each of the following operations :

(i) Y is added to the Queue

(ii) One element is deleted

(iii) Z, A and B are added

(iv) Three elements are deleted

(v) C is added

(c) Given a single linked list of characters, write a function to check whether this list is a palindrome or not. You may use any one additional data structure. 5

(d) Consider the intermediate configurations of an array being sorted. Which sorting algorithm is being used in each case ? Justify your answer. 2.5+2.5=5

(i) (4, 5, 8, 1) (1, 5, 8, 4) (1, 4, 8, 5) (1, 4, 5, 8)

(ii) (4, 5, 8, 1) (4, 5, 1, 8) (4, 1, 5, 8) (1, 4, 5, 8)

(e) Create a binary search tree using the following sequence of data : 2+2+1=5

25, 28, 40, 15, 10, 17, 20, 26

Delete 25 using (i) deletion by merging (ii) deletion by copying.

Which of the two methods of deletion is better and why ?

(f) What is a hashing ?

Insert the keys 35, 44, 61, 72, 56, 51 into a hash table of size m=7 using linear probing with hash function as the Division Method. 2+3=5

(g) Give the recursive version of the following function : 4+1=5

```
void cubes (int n)
{ for (int i =1; i<= n; i++)
        cout << i*i*I << ' ';
}
```

How will this recursive function be initially invoked for n = 5 ?

2. (a) Give template class definition for an ordered singly linked list of integers. Write a member function to insert a node in this linked list such that the list remains in order. 2+4=6

(b) Calculate the address of the element X[3][4] of the 2D array defined as int X[7][10], if the elements are stored in : 2+2=4

(i) row major order

(ii) column major order

The beginning address of the array is 100. Every element requires 4 bytes of storage.

3. (a) Write an algorithm that determines whether a given binary tree is complete. 5

(b) A binary tree has 10 nodes. The preorder and inorder traversals of the tree are shown below. Construct the tree. 5

I. Preorder : JCBADEFIGH

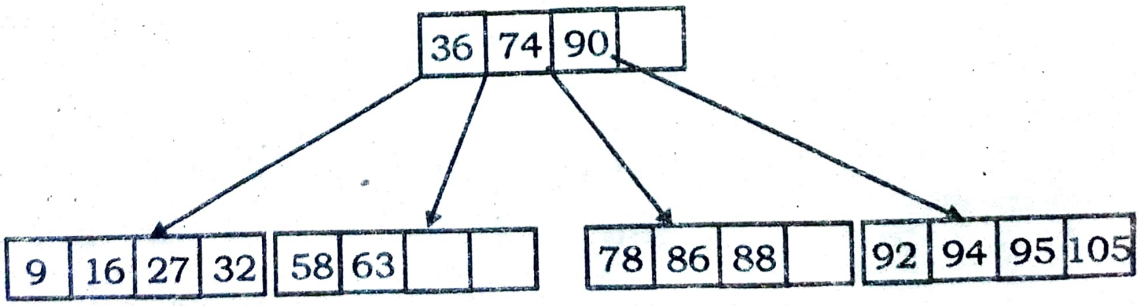
II. Inorder : ABCEDFJGIH

Also give the Postorder Traversal of the constructed tree.

4. (a) Insert the given keys one by one in the following B tree of order 5 : 5

55, 80, 40, 42, 99

Show the status of the tree after each insertion.



(b) Consider the following array of integers : 1+4=5

12, 14, 9, 18, 120, 30, 40, 35, 60

Which sorting algorithm will be best suited to sort this array ? Use this algorithm to sort it and show the contents of the array after every step.

5. (a) Given a queue of integers, write an algorithm that deletes all negative integers without changing the order of the remaining elements of the queue. 6

(b) Give an algorithm to display the minimum value in a Binary Search Tree. 4

6. (a) Apply binary search algorithm to search for 25 and 91, in the following array of integers : 3+3=6

16 25 33 43 59 64 78 87 99

Show the status of *first*, *last* and *mid* after each iteration. Also show the number of comparisons made in both the cases.

(b) A Tridiagonal matrix T of dimension n × n that has all non-zero entries on the three central diagonals is mapped to a one-dimensional array D by diagonals, starting with the lowest diagonal. Obtain the formula for the location of an element T(i, j) in D. 4

7. (a) Given a doubly linked list, write an algorithm to swap the kth node from the beginning of this list with the kth node from the end of the same list. The nodes have to be swapped and not their contents. 6

(b) Write a recursive function to find the sum of the elements of an array. 4

[This question paper contains 12 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7404** **J**

Unique Paper Code : 32341302

Name of the Course : **B.Sc.(Hons.) Computer Science**

Name of the Paper : Operating Systems

Semester : III

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Question No. **1** of **35** marks is compulsory.

(c) Attempt any **four** questions from Question No. **2** to Question No. **7**.

1. (a) Fill in the blanks : 6

(i) ..... is a necessary condition for a deadlock according to which at least one resource is held in a non-sharable mode.

P.T.O.

(ii) Loading the pages of a process into memory only when they are needed is termed as ..... .

(iii) Updating the caches of all processors to reflect any modification of data in one cache is termed as ..... .

(iv) The time needed for the required sector to rotate to the disk head during a disk access is termed as ..... .

(v) ..... is the location within the directory structure where a file system is to be attached (in Unix system).

(vi) ..... provide an interface to the services made available by an operating system.

(b) Differentiate between : 2×4=8

(i) zombie and orphan process

(ii) mutex and binary semaphore

(iii) system and application program

(iv) symmetric and asymmetric multiprocessing

(c) What will be the output of the following code ? Explain your answer. 3

```
int main()
{
   int x = 1, p;
   p = fork();
   if(p == 0)
      x = 10;
   else
   {
      wait(NULL);
      printf("%d\n",x);
   }
}
```

(d) Given the logical address 0xAEF9 (in hexadecimal) with a page size of 256 bytes, determine (i) the page number (ii) page offset. 3

(e) What is file-open count ? Where is it stored ? When does its value become zero ? 3

(f) What will be the output of the following code ? 3

```
int main()
{
  pid_t pid;
  execlp("/bin/ls","ls", NULL);
  pid = fork();
  if(pid<0)
  {
    printf("fork failed");
    return 1;
  }
  else if(pid==0)
    execlp("/bin/ls","ls",NULL);
  else
  {
    wait(NULL);
    printf("child finished");
  }
  return 0;
}
```

(g) Distinguish between the following : turnaround time, waiting time, response time. 3

(h) How many disk accesses are required to access the i^{th} block of a file in case the file system uses : 3

(i) contiguous allocation scheme

(ii) linked allocation scheme

(i) What is thrashing ? How is it related to degree of multiprogramming ? 3

2. (a) What are traps ? Mention any **two** situations in which a user program would generate a trap. 3

(b) What will be the output of the following code fragment ? Justify your answer. 3

```
int a,b;
void *func();
int main()
{
    pthread_t tid;
    a=10;
    b=20;
```

```
    pthread_create(&tid,NULL,func,NULL);
    pthread_join(tid,NULL);
    printf("a = %d, b = %d \n",a,b);
}
void *func()
{  int b;
   a = 50;
   b = 100;
}
```

(c) (i) What is the purpose of inode in Unix operating system ? 2

(ii) Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would the best-fit algorithm place processes of 212 KB, 417 KB, 112 KB and 426 KB (in that order) ? 2

3. (a) A counting semaphore was initialized to 10. At a later point in time, the semaphore has value 6. At yet another point in time, it has value –3. What is the meaning of the three values ? 3

(b) List an advantage and a disadvantage of integrating the user interface into the operating system. 3

(c) In a demand-paged memory, the page table is held in registers. It takes 8 milliseconds to service a page fault if an empty page is available or the replaced page is not modified, and 20 milliseconds if the replaced page is modified. Memory access time is 100 nanoseconds. Assume that the page to be replaced is modified 70 percent of the time. What is the maximum acceptable page-fault rate for an effective access time of no more than 200 nanoseconds ? 4

4. (a) What are the three classes of users of a file in Unix system ? 3

(b) Describe one drawback of priority based scheduling schemes. How can it be handled ? 3

(c) Consider the following lines of code from two processes P1 and P2 sharing the variable z. Explain how can the following code lead to a race condition ? 4

P1:	P2:
z += x;	z += y;

5. (a) Consider the following segment of code. Given that the goal is to print the value of variable g updated by the function func(), find and explain the flaw in the code and fix it. 3

```
int g;
void *func();
int main()
{
    pthread_t tid;
    pthread_create(&tid,NULL,func,NULL);
    printf("g = %d",g);
```

```
}
void *func()
 {
g = 10;
}
```

(b) Mention **two** advantages and **one** disadvantage of the microkernel approach to system design. 3

(c) Consider the following set of processes with the length of CPU burst given in milliseconds : 4

Process	Burst time
P1	4
P2	2
P3	7
P4	5

The processes are assumed to have arrived in the order P1, P2, P3, P4, all at time zero.

(i) Draw a Gantt chart illustrating the execution of proceses using Round Robin scheduling algorithm. (Time quantum = 3)

(ii) What is the turnaround time of each process ?

(iii) What is the waiting time of each process ?

6. (a) Briefly describe the roles of short term, medium term and long term schedulers. 3

(b) Give an example demonstrating that presence of a cycle in a resource-allocation graph does not necessarily lead to a deadlock. 3

(c) (i) Assume the value of base and limit registers are 500 and 350 respectively. Is the access to following addresses legal – 355, 500 ? 2

(ii) Assuming linked allocation and block size of 4KB, calculate the number of disk accesses required for direct access to byte 20680. 2

7. (a) Consider a disk queue holding requests to the following cylinders in the listed order : 116, 22, 3, 11, 75, 185, 100, 87. Using the C-SCAN scheduling algorithm, what is the order in which the requests are serviced ? Assume that the disk head is at cylinder 88 and moving upwards through the cylinders. 3

(b) Assuming a page size of 8KB, and a 28 bit logical address, determine : 3

(i) number of bits used to represent the page offset ?

(ii) number of entries in the page table ?

(c) (i) Determine the logical address given that the relocation register is set to 100 and a physical address 250 is generated. 2

(ii) Consider a linked allocation file system that has both logical and physical block sizes of 1-KB. If the head is currently at logical block four and the next logical block to be accessed is nine, how many physical blocks must be read from the disk ? Justify your answer. 2

[This question paper contains 7 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7405** **J**

Unique Paper Code : 32341303

Name of the Course : **B.Sc.(Hons.) Computer Science**

Name of the Paper : Computer Networks

Semester : III

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) **Section-A** is compulsory and carries **35** marks.

(c) Attempt any **four** questions from **Section-B**.

Section-A

1. (a) A bit stream of **10111011** is to be transmitted using the standard CRC method having x^3+1 as the generator polynomial. Show the actual bits transmitted. Suppose the 4th bit from the left gets inverted due to an error, check whether the error can be caught. 4

P.T.O.

(b) Ethernet requires that valid frames must be at least 64 bytes long. Give reasons for choosing the minimum frame size as 64 bytes. 2

(c) Convert the IP address whose hexadecimal representation is **C22F1582** to dotted decimal representation. 1

(d) Explain briefly the following fields of the IP header : 4

(i) Internet Header Length (IHL)

(ii) Identification,

(iii) DF & MF, and

(iv) TTL

(e) Briefly discuss the following CSMA protocols : 6

(i) 1-persistence

(ii) p-persistence and

(iii) non-persistence

(f) Match the following to one or more layers of the TCP/IP model : 5

(i) Transmission of bit stream across physical medium

(ii) Defines frames

(iii) Reliable process-to-process message delivery

(iv) Route Selection

(v) Provides user services such as email and file transfer

(g) What is the baud rate of classic 10-Mbps Ethernet ? 2

(h) Five channels, each with a 100-kHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link, if there is a need for a guard band of 10-kHz between the channels to prevent interference ? 3

(i) What does the following address mean and when are they used ? 3

(i) 0.0.0.0

(ii) 127.xx.yy.zz

(iii) 156.76.255.255

(j) Explain simplex, half-duplex, and full-duplex modes of communication. 3

(k) State the Nyquist sampling theorem for analog-to-digital conversion. 2

Section-B

2. (a) A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers ? 3

(b) Explain the concept of byte stuffing used for framing. 2

(c) Define bandwidth of a signal. A periodic signal has a bandwidth of 20 Hz. The highest frequency is 60 Hz. What is the lowest frequency ? 2

(d) What is the Nyquist sampling rate for each of the following signals ? 3

(i) A low-pass signal with bandwidth of 200 KHz ?

(ii) A band-pass signal with bandwidth of 200 KHz if the lowest frequency is 100 KHz ?

3. (a) Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital-to-analog modulation ? 4

(i) ASK (ii) FSK

(iii) PSK (iv) QAM

(b) Why has the PCM sampling time been set at 125 μsec ? 2

(c) On which layer of the TCP/IP model does the following devices operate. Briefly state their functionality : 4

(i) Repeater

(ii) Router

(iii) Bridges

(iv) Switches

4. (a) Television channels are 6 MHz wide. How many bits/sec can be sent if four-level digital signals are used ? Assume a noiseless channel. 3

(b) Explain briefly the terms : FDM, WDM, and TDM. 3

(c) What is the significance of the twisting in twisted-pair cable ? 2

(d) What is the purpose of cladding in an optical fiber ? 2

5. (a) Explain the binary exponential back-off algorithm used in CSMA/CD protocols. 3

(b) There are five classes in IPv4 addressing. Give the identifiers for each of the classes. 3

(c) Explain the TCP header fields : URG, PSH, SYN, and FIN. 4

6. (a) What is HTTP ? Explain briefly two of its message types. 4

(b) What is an URL ? Give an example to explain its parts. 3

(c) Briefly explain any **three** ICMP message types. 3

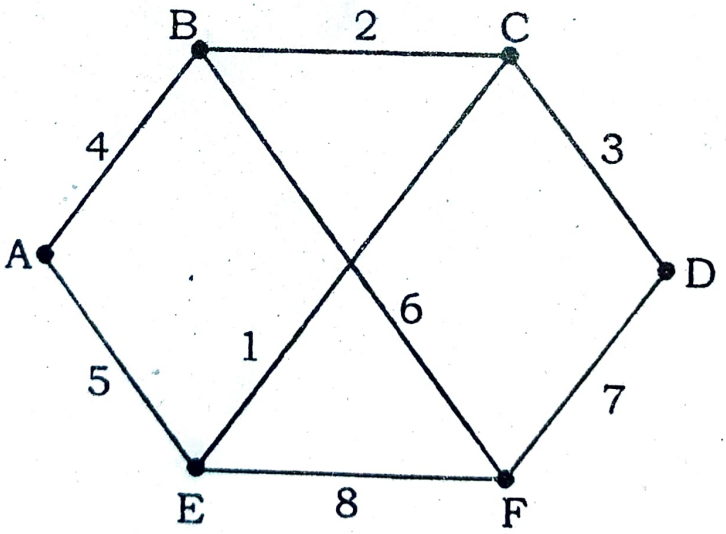
7. (a) Consider the following subnet where distance vector routing is used. The following information have just arrived at the router C : 4

(i) From B : (5,0,8,12,6,2)

(ii) From D : (16,12,6,0,9,10) and,

(iii) From E : (7,6,3,9,0,4)

The measured delays to B, D, and E, are 6, 3, and 5 respectively. Give the new routing table for C specifying both the delay and the outgoing line to use.



(b) Compare ARP and RARP. 3

(c) What is MIME ? What problems does it solve ? 3

[This question paper contains 4 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7406** **J**

Unique Paper Code : 32341501

Name of the Course : **B.Sc.(Hons.) Computer Science**

Name of the Paper : Internet Technologies

Semester : V

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Question No. **1** is compulsory for **Section-A**.

(c) Attempt any **four** questions from **Section-B**.

Section - A

Note : Attempt **all** questions from this Section.

1. (a) Describe Auto-boxing and Auto-unboxing in java. 3

(b) What would be the output of : 3

(i) parseFloat("xy2.57")

(ii) document.write(1+2+"3")

(iii) fn:contains('test String', 'TEST')

P.T.O.

(c) Write a JavaScript code to display the information about the Operating System and browser being used by the Client. 3

(d) What is the significance of Introspector and Event Set Descriptor classes in Java Bean API ? 3

(e) List the types of driver available in JDBC and explain when are they used. 4

(f) Consider the following table : 4

Name	EmpID
ABC	100
PQR	101
DEF	102
GHI	103

Write down the output when the following methods have been executed in sequence :

(i) next ()

(ii) relative (2)

(iii) previous ()

(iv) relative (-2)

(g) What are directives ? List and explain usage of different types of directives available in JSP. 5

(h) Explain Math object with its five methods and five properties. 5

(i) Explain HTTP request and response header in detail. 5

Section - B

Note : Attempt any **four** questions from this Section.

2. (a) Write a program to implement Dynamic Stack using Arraylist with the help of an abstract stack class. 5

(b) How array can be defined in JavaScript ? Explain the join method with the help of an example. 2+3=5

3. (a) Define a student bean class for getting and setting the following properties : 6

(i) Name

(ii) Roll No.

(iii) Address

(b) Explain <sql:setDataSource> and its attributes. 4

4. (a) What is connection pooling ? Explain its working with the help of an example. 1+4=5

(b) Write a JavaScript program which takes list of user input and sorts it using bubble sort. 5

5. (a) Give two ways to read and insert bean properties in a JSP page. 4

(b) Design a JSP page to implement a custom tag "today" using tag handler class and descriptor file. 6

6. (a) Write a JavaScript program with 3 textboxes and 3 radio buttons to display the functionality of max, min and average based on the user selection. 5

(b) Explain the lifecycle of a JSP page. How it is different from the life cycle of a servlet ? 5

7. (a) Differentiate between : 6

(i) Get and Post method

(ii) Client-side and Server-Side scripting

(iii) RowSet and ResultSet

(b) Explain the output of following JSP code : 4

```
<%@ taglib uri="http://java.sun.com/jsp/
jstl/core" prefix="c" %>
<%@ taglib uri="http://java.sun.com/jsp/
jstl/functions" prefix="fn" %>
<html>
<head>
<title>Using JSTL Functions</title>
</head>
<body>
<c:set var="string1" value="This is first
String."/>
<c:set var="string2" value="This <b>is second
String.</b>"/>
<p>With escapeXml() Function:</p>
<p>string (1) : ${fn:escapeXml(string1)}</p>
<p>string (2) : ${fn:escapeXml(string2)}</p>
<p>Without escapeXml() Function:</p>
<p>string (1) : ${string1}</p>
<p>string (2) : ${string2}</p>
</body>
```

[This question paper contains 7 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7407** **J**

Unique Paper Code : 32341502

Name of the Course : **B.Sc.(Hons.) Computer Science**

Name of the Paper : Theory of Computation

Semester : V

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) **All** questions in **Section-A** are compulsory.

(c) Attempt any **four** questions from **Section-B**.

(d) Parts of a question must be answered together.

(e) Assume alphabet $\Sigma = \{a,b\}$ unless stated otherwise.

P.T.O.

Section - A

1. (a) Do the following regular expressions represent the same language (give reason)

$R_1 = ((a + b)(a + b))^* a$

$R_2 = (a + b)((a + b)(a + b))^* a$

(b) Write a regular expression and build a deterministic finite automata for the language containing all strings having **a** at every odd position. 2+

(c) Describe in English the language represented by the following regular expressions : 2+

(i) $b^*ab^*ab^*ab^* + b^*ab^*ab^*$

(ii) $(a + b)^*aa(a + b)^*$

(d) Describe pumping lemma for regular languages.

(e) Based on the language S = {aa, ba, ab, bb} describe the language S^*.

(f) What are the languages generated by the following grammars : 3+3

(i) $S \rightarrow XA$

$X \rightarrow aXb \mid \Lambda$

$A \rightarrow aA \mid \Lambda$

(ii) $S \rightarrow AB$

$A \rightarrow aA \mid \Lambda$

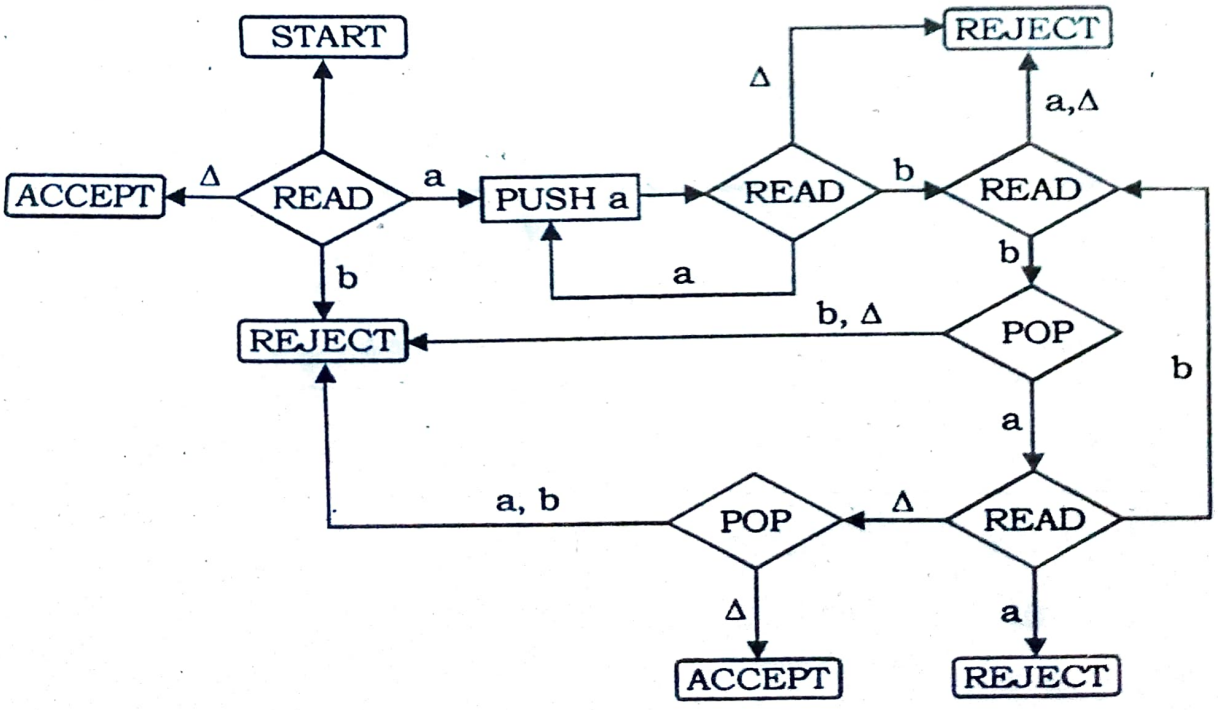
$B \rightarrow bB \mid \Lambda$

(g) Show that the following CFG is ambiguous : 3

$S \rightarrow X\,a\,X$

$X \rightarrow a\,X \mid b\,X \mid \Lambda$

(h) Describe the language (in English) accepted by the following PDA : 3



(i) Describe the halting problem.

(j) Let $M=(K, \Sigma, \delta, s, \{h\})$, where

$K = \{q_0, q_1, h\}$

$\Sigma = \{a, b, \sqcup, \triangleright\}$

$S = q_0$

and δ is given by the following table :

q	σ	$\delta(q, \sigma)$
q_0	a	(q_1, b)
q_0	b	(q_1, a)
q_0	$\sqcup$	$(h, \sqcup)$
q_0	$\triangleright$	$(q_0, \rightarrow)$
q_1	a	$(q_0, \rightarrow)$
q_1	b	$(q_0, \rightarrow)$
q_1	$\sqcup$	$(q_0, \rightarrow)$
q_1	$\triangleright$	$(q_1, \rightarrow)$

Trace the computation of M starting from th configuration $(q_0, \triangleright \underline{a}abbba)$.

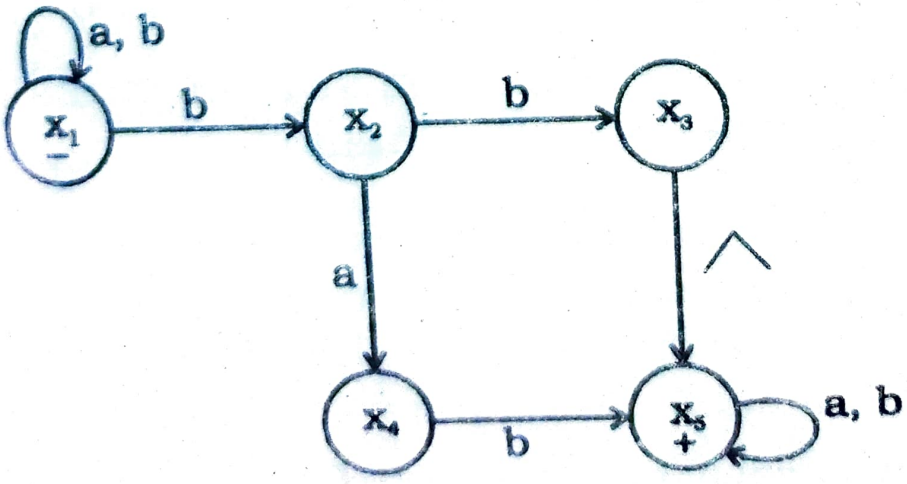
Section -B

2. (i) Let L=All strings that end with aa or bb. Construct DFAs for L and L' (i.e., Complement of L). 6

(ii) Is the language $\{a^m b^m ; m \geq 0\}$ regular? Justify using Pumping Theorem. 4

3. (i) Build an FA accepting the language comprising of all strings having first two characters same as the last two. 6

(ii) Convert the following Transition Graph (TG) into regular expression using Bypass algorithm. 4



4. (i) Give Context Free Grammar (CFG) for the following language : 5

$\{a^i b^j c^k \mid i + j = k; i, j, k \geq 0\}$ and $\Sigma = \{a,b,c\}$

(ii) Build pushdown automation (PDA) to accept the following language : 5

$\{ Sb^{n+1}$; S is a string of only a's, n=length(S), $n \geq 1 \}$

5. (i) Convert the following CFG to CNF : 5

$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow (E)$

$E \rightarrow 6 \mid 7$

The terminals here are + * ( ) 6 7.

(ii) Prove that the recursive languages are closed under complementation. 5

6. (i) Design a Turing Machine that scans to the right until it finds two consecutive a's and then halts. The alphabet of the Turing machine should be {a, b, ␣, Δ}. 5

(ii) Prove that context-free languages closed under Union and concatenation. 5

7. (i) Build FA for each of the following regular languages L_1 and L_2. 4

$L_1 = b(a+b)^*$ $L_2 = a(a+b)^*b + b(a+b)^*a$

(ii) Build FA for $L_1 \cap L_2$. 4

(iii) Describe in English the language represented by $L_1 \cap L_2$. 2

[This question paper contains 6 printed pages.]

Your Roll No.....

J

Sr. No. of Question Paper : 7880

Unique Paper Code : 32347504

Name of the Paper : Microprocessors

Name of the Course : **B.Sc. (H) Computer Science : DSE-1**

Semester : V

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions from **Section A.**
3. Attempt any **four** questions from **Section B.**
4. Attempt all parts of a question together.

SECTION A

1. (a) "Segment and Offset Addressing Scheme Allows Relocation" Justify the statement. (2)

P.T.O.

(b) Differentiate between MOVZX and MOVSX instruction with the help of an example. (3)

(c) Explain how the Near and Far CALL instructions function. (3)

(d) What is a displacement? How does it determine the memory address in a MOV [2000H], AL instruction? (3)

(e) Which three minimum mode 8086/8088 pins are decoded to discover whether the processor is halted? (3)

(f) Contrast a memory-mapped I/O system with an isolated I/O system. (3)

(g) List the number of data items stored in each of the following memory devices and the number of bits in each datum :

(i) 16K × 1

(ii) 2K × 4

(iii) 64K × 4 (3)

(h) What is the purpose of D, S and NT bits of FLAG register? (3)

(i) Which type of JMP instruction (short, near, or far) assembles for the following :

(i) If the distance is 0210H bytes

(ii) If the distance is 0020H bytes

(iii) If the distance is 10000H bytes (3)

(j) What three modes of operation are available to 8255 programmable peripheral interface? (3)

(k) Which conditional jump instructions follow the comparison of signed and unsigned numbers? (3)

(l) What is the purpose of ICW1, ICW2 and OCW1 in programming the 8259A programmable interrupt controller? (3)

SECTION B

2. (a) What do you mean by the program-invisible registers? Explain the purpose of IDTR and TR. (5)

(b) What is an assembly language directive? Explain the purpose of following directives :

(i) .BREAK

(ii) .386

(iii) .STARTUP

(iv) EQU (5)

3. Explain the difference between :

(a) LDS and LSS

(b) PUSHF and PUSHFD

(c) IRET and IRETD

(d) INSW and OUTSB

(e) JAE and JGE (10)

4. (a) Draw and explain the write bus cycle for 8086/8088 microprocessor. (5)

(b) Give the new features made available in Pentium microprocessor. (5)

5. (a) Explain how the command register programs the operation of the 8237 DMA. (5)

(b) Describe the register relative addressing mode of the 8086 with the help of an example. (5)

6. Write the function of following instructions :

(a) NOP

(b) BOUND

(c) CMOV

(d) POPAD

(e) STOSW (10)

7. (a) Given that DS = 1100H, BX=0200H, LIST= 0250H and SI=0500H. Determine the address accessed by each of the following instructions, assuming real mode operation:

(i) MOV LIST[SI], EDX

(ii) MOV CL, LIST[BX+SI]

(iii) MOV CH, [BX+SI] (5)

(b) How do CALL and RET instructions affect stack? Explain with an example.

[This question paper contains 8 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **8019** **J**

Unique Paper Code : 32347503

Name of the Course : **B.Sc.(Hons.) Computer Science : DSE - 2**

Name of the Paper : Operational research For Computer Science

Semester : V

Time : 3 Hours ***Maximum Marks : 75***

Instructions for candidates :

(i) Write your Roll No. on the top immediately on receipt of this question paper.

(ii) Question No. **1** of **Section - A** is compulsory (**7×5=35** marks).

(iii) Attempt any **four** questions from **Section - B** **2** to **7** (**10** marks each).

(iv) Parts of a question must be answered together.

(v) Use of simple calculator is allowed.

(vi) The symbols have their usual meaning.

P.T.O.

Section - A

1. (i) Check whether the first, third and fifth columns of

$$A = \begin{pmatrix} 2 & 4 & 6 & 2 & 4 \\ 1 & 2 & 3 & 1 & 1 \\ 2 & 4 & 8 & 0 & 0 \\ 3 & 6 & 7 & 5 & 9 \end{pmatrix}$$

are linearly independent or not ?

(ii) A group of four boys and four girls are planning on a one day picnic. The extent of mutual happiness between the boy i and girl j , when they are together is given by the following matrix :

	G1	G2	G3	G4
B1	11	1	5	8
B2	9	9	8	1
B3	10	3	5	10
B4	1	13	12	11

The problem is to decide proper matching between the boys and girls during the picnic that will maximize the sum of all the mutual happiness of all the couples. 5

(iii) Define dual prices. Write the dual of the following LPP : 5

Maximize $Z = 2x_1 + 9x_2 + x_3$

Subject to $x_1 + 4x_2 + 2x_3 \geq 5$

$3x_1 + x_2 + 2x_3 \geq 4$

$x_1 + 2x_2 + 3x_3 = 90$

$x_1, x_2 \geq 0$ and x_3 unrestricted in sign.

(iv) Consider the following LP with two variables :

Maximize $Z = 2x_1 + 3x_2$

Subject to

$x_1 + 3x_2 \leq 12$

$3x_1 + 2x_2 \leq 12$

$x_1, x_2 \geq 0.$

Determine all the basic solutions of the problem, and classify them as feasible and infeasible. Verify optimal solution graphically. Show how infeasible basic solutions are represented on graphical solution space. 5

(v) In a 3X3 transportation problem, let x_{ij} be the amount shipped from source i to destination j, and let C_{ij} be the corresponding transportation cost per unit. The amounts of supply at sources 1,2 and 3 are 15, 30 and 85 units respectively, and the demands at destination 1, 2 and 3 are 20, 30 and 80 units respectively. Assume

that the starting North-West –Corner solution is optimal and the associated values of the multipliers are given as $u_1 = -2$, $u_2 = 3$, $u_3 = 5$, $v_1 = 2$, $v_2 = 5$ and $v_3 = 10$.

(a) Find the associated optimal cost.

(b) Determine the smallest value of C_{ij} for each non-basic variable that will maintain the optimality. 5

(vi) Classify the state of following Markov Chain. Find period of each state : 5

$$\begin{pmatrix} 1/2 & 1/4 & 1/4 & 0 \\ 0 & 0 & 1 & 0 \\ 1/3 & 0 & 1/3 & 1/3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(vii) Consider (M/M/1) queue with FCFS scheduling and infinite queue capacity. In an eight-hr day find the expression for the time for which the server would remain busy.

Section - B

2. Ozark farm uses at least 800*lb* of special feed daily. The special feed is a mixture of corn and soyabean meal with the following compositions : 10

Lb per *lb* of feedstuff			
Feedstuff	Protein	Fiber	Cost($/*lb*)
Corn	0.09	0.02	0.30
Soyabean meal	0.60	0.06	0.90

The dietary requirements of the special feed are at least 30% protein and at most 5% fiber. The goal is to determine the daily minimum-cost feed mix. Formulate the above problem as linear programming problem and solve it graphically.

3. Solve the following LPP using two-phase method :

Maximize $z = 3x_1 + 2x_2 + 3x_3$

Subject to $2x_1 + x_2 + x_3 = 4$

$x_1 + 3x_2 + x_3 = 12$

$3x_1 + 4x_2 + 2x_3 = 16$

$x_1, x_2, x_3 \geq 0$ 10

4. (a) Consider the following systems of equations :

$$x_1 + 2x_2 - 3x_3 + 5x_4 + x_5 = 8$$

$$5x_1 - 2x_2 + 6x_4 + x_6 = 16$$

$$2x_1 + 3x_2 - 2x_3 + 3x_4 + x_7 = 6$$

$$-x_1 + x_3 - 2x_4 + x_8 = 0$$

$$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 \geq 0$$

Let x_5, x_6, x_7, x_8 be the given initial basic feasible solutions. Suppose that x_1 become a basic. Which of the given basic variables must become non-basic at zero level to guarantee that all the variables remain non negative, and what is the value of x_1 in the new solution ? Repeat this procedure for x_2, and x_4 in that order. 5

(b) Formulate transportation problem as LPP. 5

5. (a) What do you mean by convex set ? Check whether the set 5

$Q=\{(x,y) \mid 2x+3y \leq 6\}$ is convex or not ?

(b) Every year, during the March through September growing season, a gardener uses a chemical test, to check soil condition. Depending on the outcome of test, productivity for the new season can be one

of the three states: 1) good 2) Fair 3) Poor. Over the years, the gardener has observed that last year's soil condition impacts current year's productivity and that the situation can be described by following Markov Chain :

$$P = \begin{pmatrix} .2 & .5 & .3 \\ 0 & .5 & .5 \\ 0 & 0 & 1 \end{pmatrix}$$

Determine the steady state probability distribution for above situation. 5

6. In a railway marshalling yard, goods train arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the following :

(i) The mean queue size.

(ii) The probability that the queue size exceeds 10.

(iii) Average size of non-empty queue.

(iv) The probability of no train waiting in queue. 10

7. (a) Consider the following LP model :

Maximize $Z=3X_1+2X_2+5X_3$

S.T.

$$X_1+2X_2+X_3+X_4=30$$

$$3X_1+2X_3+X_5=60$$

$$X_1+4X_2+X_6=20$$

$$X_1,X_2,X_3,X_4,X_5,X_6\geq 0$$

Check the optimality and feasibility of the following basic solutions :

Basic Variables $=(X_4,X_3,X_6)$,

$$\text{Inverse}=\begin{pmatrix}1 & -1/2 & 0\\ 0 & 1/2 & 0\\ 0 & 0 & 1\end{pmatrix}$$ 5

(b) Solve the following using Simplex Method :

Maximize $Z=2X_1+4X_2$

s.t.

$X_1+2X_2\leq 5$

$X_1+X_2\leq 4$

$X_1,X_2\geq 0$

Find 3 solutions for above problem. 5

This question paper contains 11 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **8460-A**

Unique Paper Code : **32345104** **J**

Name of the Paper : **Programming Using Python**

Name of the Course : **Computer Science : G.E. for Honours**

Semester : **I**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. **1** is compulsory.

Attempt any *five* questions out of Q. **2** to Q. **8**.

Parts of a question must be answered together.

1. (*a*) What unit is used to measure the following : 1

(*i*) CPU Speed

(*ii*) Memory Size.

(*b*) Give the output of the following code snippet : 2

```
x, y = 2, 6
x, y = y, x + 2
print y
print x>>2
```

P.T.O.

(c) Given the set marks as : 2

```
marks = {60,70,75}
```

Give the output/indicate error in each of the following code snippets : 2

(*i*)
```
marks1 = marks + {2}
print(marks1)
```

(*ii*)
```
print(marks[1:])
```

(*d*) The tuple t is defined as : 2

```
t = ("Ram","Shyam",[40,38])
```

Give the output/indicate error in each of the following code snippets :

(*i*)
```
t[1] = "Lakhan"
print(t)
```

(*ii*)
```
t[2][0] = 45
print(t)
```

(*e*) Identify the error in the following code snippet : 2

```
x = 101
if (x%2) = 0:f
    print("Even Number")
else
    print("Odd Number")
```

(*f*) Define a class `Triangle`, each of whose instances comprises three attributes `side1`, `side2` and `side3`. Define the constructor for the class. 1+2=3

(*g*) Given the list names as : 2

```
names = ["John","Ben","Walter","Mike"]
```

Write a single code statement that sorts the list elements in the ascending order of length of the elements.

(*h*) A queue `myQueue` has two attributes, `front` and `rear` that contain indices of the first and last elements of `myQueue` at any instant. Consider that `myQueue` is

initially empty. Show using diagrams, the contents of myQueue, when elements : 2

(*i*) "Sita", "Gita" and "Rita" are added to myQueue in that order.

(*ii*) One element is deleted from myQueue.

(*i*) Write a Python program that accepts as input your favorite color as a string. Interchange the first and last characters of your favorite color and display the resulting string. 3

(*j*) Write a function that takes as input a list of strings and a string (say str1) to be searched in the list. The function should use linear search to check whether the resulting string exists in the list. It should return True if the string is present in the list and False otherwise. (Do not use Python built-in functions for the search.) 3

(k) (i) Define a dictionary projects mapping Project ID to number of employees assigned to that project as per the following table :

Project ID	Number of Employees
"P1"	10
"P2"	6
"P3"	7

(ii) What will be the output produced on execution of the statement ?

```
print(max(projects))
```

(l) Which mode will you use to open a file in Python for writing to a file without overwriting the existing contents of that file ? 1

2. (a) Write a python program to take n numbers as input from the user and sort them using seletion sort. Show the modified list at each step of selection sort. 6

(*b*) Using a while loop, write a user defined python functio to find the sum of all the positive numbers entered b the user. As soon as the user enters a negative numbe stop taking in any further input from user and displa the sum.

(*c*) Give the output of the following code snippet :

```
age = input("Enter your age and I
will double it:")
print(age*=2)
```

3. (*a*) Write a function `func()` that takes two parameters: a list `empId` and a list `projId` having corresponding projects that employees are working on. For example,

```
empId = [1,2,3,4]
projId = ["p1","p2","p1","p1"]
```

The function `func()` returns a list of tuples, each of which includes `projID`, and the list of employees working on it. For instance, the function call `func(empId, projId)` would return `[("p1",[1,3,4]), ("p2",[2])]`.

(*b*) A garment shop is offering 10% discount on garments for girls and 5% discount on garments of boys. In case the age of the child is below 5 years the discount offered is 15% irrespective whether the customer is a girl or a boy. Write a python program that takes as input the `name`, `age`, `gender` and `price_of_items` bought and displays the net payable amount. 4

4. (*a*) Write a Python function `pattern(n)` which takes a number `n(0<n<10)` as parameter and prints a pattern like the one shown below. For example, for `n = 5`, the following pattern is displayed : 4

```
1
1  2
1  2  3
1  2  3  4
1  2  3  4  5
```

(*b*) Write a user defined function `sumSquares(n)` in Python that accepts a number `n` as an argument. The function returns sum of squares of first `n` numbers. Write a Python statement to call this function and print the result for n=6. 6

5. (*a*) Consider the sets `s1` and `s2` defined below : 4

```
s1 = {"P1","P2","P3","P4","P5"}
s2 = {"P1","P3","P4"}
```

What will be the output produced on execution of the following statements for the given sets :

(*i*) `set.symmetric_difference(s1, s2)`

(*ii*) `s1.union(s2)`

(*b*) Consider the following string : 2

```
msg = "Goodmorning! Welcome To This Class"
```

Determine the output of the following functions :

(*i*) `msg.find("o")`

(*ii*) `msg.capitalize()`

(c) Write a Python program to write lines of text to a file "File1.txt". Then close the file read the lines written to it and prints them. 4

6. (a) Evaluate the following postfix expression using a stack. Show the contents of the stack at each step : 6

```
A  B  C  *  +  D  +
```

(b) What will be the output of the following line : 2

```
"sum of 2 and 3 is" + 5
```

(c) Write a Python program that reads a number in feet, converts it to meters, and displays the result. 2

One foot = 0.305 meters.

7. (a) Write a Python program to accept a string from the user. Replace all the vowels in the given string with the symbol "*". Display the modified string. 6

(b) Create a dictionary `subj_stud` that maps a list of students to the subject they are studying as per the

following information : 4

Subject	Students
Maths	Joe, Sue, Ben
Physics	Joe, Mike, Michael
Biology	Sue, John
Computers	John, Chris

Write statements for finding the subjects with the minimum number of students and removing those subjects from `subj_stud` (in this case Biology and Computers).

8. Define a class `Student` storing information related to students of an institution. The class should contain the following data members : 4+3+3-10

(*i*) `rollNum` : Student's Roll No,

(*ii*) `name` : Student's name and

(*iii*) `percentage` : Student's percentage.

The class should support the following methods :

(*i*) Constructor

(*ii*) `set_percentage(newPercentage)`

(*iii*) `get_data()`

Write Python statements for the following :

(*i*) Create an object `stud1` of the class `Student` having `rollNum` as `101`, `name` as `"Bharat"` and `percentage` as `79`.

(*ii*) Set the value of percentage to `81` for the object `stud1` using `set_percentage` method.

(*iii*) Display the values of all data members of `stud1` using `get_data` method.

[This question paper contains 4 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7046** **J**

Unique Paper Code : 62341101 - OC

Name of the Course : **B.A.(Programme) Computer Application**

Name of the Paper : Computer Fundamentals

Semester : I

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) **Section -A** is compulsory.

(c) Attempt any **five** questions from **Section-B**.

Section - A

1. (a) Explain the use of computers in Education and Government. 2

(b) Give full form of the following abbreviations : 3

(i) PCB

(ii) AGP

(iii) SCSI

P.T.O.

(c) Define a bit and a byte. What are the two key factors that characterize the memory ? 3

(d) List any four computers in the category of microcomputer. 2

(e) Name three pointing devices. Also in which area each pointing device is used ? 3

(f) Perform the following : 3

(i) Convert the $(47.75)_{10}$ number into binary

(ii) Convert the $(E4.16)_{16}$ number into Decimal

(g) What is a sign bit ? Which bit is considered as a sign bit when representing a number ? 2

(h) Name and write the functionality of three buses that are involved in the interaction of CPU with memory and I/O devices. 3

(i) List any two advantages of Cloud computing. 2

(j) State the purpose of system software 2

Section - B

2. (a) Differentiate Microcomputer and Minicomputer with examples. 4

   (b) Differentiate between Primary Memory and secondary memory. 4

   (c) Explain the booting process when computer is switched on. 2

3. (a) What is a bootstrap loader? List the different kind of ROM memory. 5

   (b) List the different memories available in the computer in order of their hierarchy with respect to the CPU. 5

4. (a) Give differences between the following : 2+2=4

   (i) SIMM and DIMM memory module

   (ii) Impact printers and Non Impact printers

   (b) Describe hand-held scanners and flat-bed scanners with examples. 4

   (c) What are magneto-optical disk ? 2

5. (a) Perform the following : 2+2=4

   (i) Find 1's complement of the number (11000011111)

   (ii) Find 2's complement of the number (1100000100)

(b) Perform binary addition of the following numbers : 2+2=4

(i) (+7) + (-9)

(ii) (-12) + (+15)

(c) How is Unicode different from other binary coding schemes ? 2

6. (a) Explain any two parameters use to measure the performance of a computer system ? 2+2=4

(b) Explain any two functions performed by an operating system. 2+2=4

(c) What do you understand by device driver? Explain. 2

7. (a) What do you understand by computer virus ? How it works ? How to cure the infected system ? 2×3=6

(b) Define word size. What are the functions of the control unit ? 1+3=4

8. Write short notes on the following terms : 2×5=10

(i) Google Scholar

(ii) Monitor

(iii) eLibrary

(iv) Embedded systems

(v) CMOS

This question paper contains 4 printed pages.

Your Roll No. .....

Sl. No. of Ques. Paper	: **8636**	**J**
Unique Paper Code	: **62341101**	
Name of Paper	: **Computer Fundamentals**	
Name of Course	: **B.A. (Prog.) Computer Applications**	
Semester	: **I**	
Duration	: **3 hours**	
Maximum Marks	: **75**	

Attempt ***all*** *the parts of Question No. 1.*

Attempt any ***five*** *questions from Question No. 2 to Question No. 8. All parts of a question should be answered together.*

SECTION A

Attempt all the parts.

1. (a) Write the full forms of :

(i) MICR

(ii) FLOPS

(iii) EEPROM

(iv) OMR 4

(b) Convert the binary number 011011 into the following representations :

(i) 1's complement

(ii) 2's complement 2

P.T.O.

(c) Differentiate between volatile memory and non-volatile memory. Give examples of each. 2

(d) Briefly explain the working of the following registers :

(i) PC

(ii) MBR 4

(e) Add $(01010)_2$ to $(10000)_2$. 2

(f) Define the following :

(i) Multiprogramming.

(ii) Cache memory. 4

(g) What is application software? Explain giving example. 3

(h) Arrange the memories in increasing order of their speed :

Register, RAM, Hard Disk, Magnetic Tape 2

(i) Convert the following numbers to binary numbers :

(i) $(1694)_{10}$

(ii) $(135)_8$ 2

SECTION B

Attempt any five questions.

2. (a) What are Point-and-Draw devices? Explain any *two* with examples. 6

(b) What is RAM? Briefly describe the two types of RAM. 4

3. (a) Differentiate between :

(i) Dot Matrix and Inkjet Printers

(ii) Direct access and Sequential access.

(iii) Minicomputer and Supercomputer. 6

(b) What are Magnetic tapes? How is the data stored on them? 4

4. (a) What do you understand by Timesharing? What are its advantages? 4

(b) Define operating system. What are its functions? 6

5. Write short notes on :

(i) Cloud computing

(ii) ROM

(iii) Microcomputers

(iv) Flash Drive

(v) Mouse 2×5

6. (a) What are the components of computer hardware? Describe functions of each component with the help of a diagram. 6

(b) Define a Bus. What are the different types of buses? 4

7. (a) Subtract the following using complementary method :

(i) $(110111)_2 - (0100100)_2$

(ii) $(1100)_2 - (1011)_2$ 4

(b) What is an optical disk? Explain the working of an optical disk. 6

8. (a) Explain briefly the use of computers in the following areas :

(i) Advertising

(ii) Medicine

(iii) Home.

(b) What do you understand by base of a number in a number system? Give an example to illustrate the role of base in positional number system.

This question paper contains 4+1 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **7086**

Unique Paper Code : **62344328** **J**

Name of the Paper : **Computer Networks and Internet Technologies**

Name of the Course : **B.A. (Programme) Computer Applications**

Semester : **III**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Section A is compulsory.

Attempt any *five* questions from Section-B.

Section - A

(Compulsory)

1. (*a*) Describe the following terms : 6

(*i*) Protocol

(*ii*) WAN

(*iii*) Transmission Medium.

(*b*) Give *two* properties of a JavaScript language. 2

P.T.O.

(*c*) Differentiate between a static and a dynamic web page.

(*d*) Write a command to create a link to a web page in an HTML file.

(*e*) Write HTML statement to make "pic.jpg" as background picture of a web page.

(*f*) What is a twisted pair cable ? Differentiate between Category 3 and Category 5 twisted pair cables.

(*g*) What is the full form of HTTP ? In which layer HTTP protocol operates ?

(*h*) What is mesh topology ? Give *one* advantage and *one* disadvantage of mesh topology.

Section - B

(Attempt any **5** questions)

2. (*a*) Compare the characteristic features of Hubs and Switches based on the layers, these devices operate and the way these devices handle data transmission.

(*b*) Write a program in JavaScript, to accept *n* numbers from user to find their sum and average. 5

3. (*a*) What is microwave transmission ? Give *two* advantages of microwave communication over fiber. 5

(*b*) Write an HTML program to generate the following web page : 5

Academic Performance
1. Excellent 2. Very Best 3. Best 4. Average
Other Qualities
• Socially Responsible • Polite • Helpful • Adaptive

4. (*a*) Write an HTML code to generate the following table :

Column 1	Column 2	Column 3
Row 1 Cell 1	Row 1 Cell 2	Row 1 Cell 3
	Row 2 Cell 2	Row 2 Cell 3
Row 3 Cell 1		

(*b*) Give any *three* applications of internet. 3

(*c*) Which function is performed by the "repeater". 2

5. (*a*) What are JavaScript datatypes ? Write about any *two* datatypes available in JavaScript. 5

(*b*) List different layers of OSI reference model. Write about the functions performed by the network layer in the OSI reference model. 5

6. (*a*) What do you understand about the criteria like performance, reliability and security in a computer network. 5

(*b*) Describe the term URL with its different parts ? How is it different from URI ? 5

7. (*a*) Differentiate between simplex, half-duplex, and full-duplex communication channel. 5

(*b*) Describe the functions performed by the following HTML tags : 5

(*i*) <HR>

(*ii*) <IMG>

(*iii*)

(*iv*) <P>

(*v*) <I> text </I>

8. Write short notes on the following (any *five*) : 10

(*a*) Web Crawler

(*b*) Search Engine

(*c*) Increment and Decrement operators in JavaScript

(*d*) Hypertext

(*e*) Geosynchronous Satellite

(*f*) Deep Web

(*g*) Client server network

(*h*) SMTP.

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7275 **J**

Unique Paper Code : 42344304

Name of the Paper : Operating Systems

Name of the Course : **B.Sc. (Prog.) / B.Sc. Math. Sciences**

Semester : III

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. **1** is compulsory.
3. Attempt any **five** from remaining seven questions.
4. All parts of a question must be done together.

1. (a) Name two services provided by operating system. (2)

   (b) How does an operating system prevent the CPU from being infinitely over run by user program? (2)

P.T.O.

(c) Differentiate between pre-emptive and non pre-emptive scheduling. (3)

(d) List two system calls each used for process control, file management and device management. (3)

(e) Differentiate between multiprogramming and multiprocessing. (3)

(f) What is use of a page table in paging memory management? (3)

(g) What is address binding? (3)

(h) Explain different commands to compare files in unix operating system. (3)

(i) List three benefits of "the ability of operating system to execute a program that is only partially in memory". (3)

2. (a) Consider the following set of processes, with the length of the CPU burst times given in milliseconds : (3×2=6)

Process	Burst Time	Priority	Arrival Time
P1	8	3	0.0
P2	4	2	0.4
P3	1	1	1.0

(i) Draw Gantt charts illustrating the execution of these processes using FCFS, SJF(non-preemptive), a preemptive priority (small priority number means high priority), and a RR (quantum=1) scheduling.

(ii) Calculate average waiting time and average turnaround time for all above mentioned scheduling algorithms.

(b) Describe multilevel feedback queue scheduling. (4)

3. (a) Define process. Explain different process states. (6)

(b) Explain "Layered Approach" to Operating System design. (4)

4. (a) Differentiate between static and dynamic linking. (6)

(b) What are the reasons for a parent process to terminate execution of its child processes? (4)

5. (a) Describe challenges in programming for multicore systems. (6)

(b) Assuming the 1-KB page size, what are the page numbers and offsets for the following address references under paging scheme of memory allocation?

(i) 2375

(ii) 4075

(iii) 33

(iv) 14866 (4)

6. (a) Given memory partitions of 200KB, 600KB, 100KB, 300KB and 500KB (in order). How would each of the first fit, best fit and worst fit algorithm place processes of 350 KB, 150KB, 250KB and 450KB (in order)? Which algorithm makes the most efficient use of memory? (6)

(b) What is external fragmentation? How can it be solved? (4)

7. (a) Explain three modes of **vi** editor and explain how can you switch from one mode to another. (6)

(b) Write a shell program to compute **1/n!** for a given n. (4)

8. Write short notes on **any two** : (2×5)

(a) Segmentation scheme of memory Allocation

(b) Unix System Architecture

(c) Demand paging and page fault

Your Roll No. .....

No. of Paper	: 7285	J
Unique Paper Code	: 42343501	
Name of the Paper	: System Administration and Maintenance	
Name of the Course	: B.Sc. (Prog.) / Math. Sc. : SEC	
Semester	: V	
Duration	: 2 hours	
Maximum Marks	: 25	

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. **1** *is compulsory. Attempt* ***three*** *questions from Q. No. 2 to Q. No. 6. Parts of a question must be answered together.*

(a) What is the difference between the Linux commands `cd.` and `cd..`? 1

(b) List two important services provided by an Operating System. 2

(c) Express the following file permissions in Linux in binary form: 2

```
rwxrw-r--
```

(d) Give a Linux command to interactively delete three files, say, `f1`, `f2`, `f3` stored in the current directory. 2

P. T. O.

(e) What is the use of a firewall? 1

(f) What is a *remote desktop connection*? 2

2.(a) Give a diagram showing the architecture of Windows Operating System. 3

(b) What happens on execution of the following commands? 2

```
i)   echo  "welcome"
ii)  tty
```

3. What will happen on execution of each of the following LINUX commands: 5

```
(i)   ls >> file1
(ii)  cal 11 2018
(iii)   date +"%h %m"
(iv)  chmod -R a+x abc
(v)   cat file1 file2
```

4.(a) What is the use of encryption? 3

(b) What will happen on execution of the command `ls|wc-l` in Linux ? 2

5.(a) What is a collating sequence? A computer uses ASCII for its internal representation of characters. Write the order in which the computer will sort the following strings. 3

```
BAD,  Good, 512, BaD,  ADD
```

(b) What is the purpose of each of the following commands in Linux: 2

(i) `who`
(ii) `ps`

6.(a) Differentiate between *homegroup* and *domain* network types. 3

(b) What will happen on the execution of each of the following LINUX commands : 2

i) `ls -lt`
ii) `ls -Fx`

This question paper contains 10 printed pages.

Your Roll No. .....

No. of Ques. Paper	**: 8174 J**
nique Paper Code	**: 32345102**
ame of Paper	**: Introduction to Programming (OC)**
ame of Course	**: Computer Science : Generic Elective**
emester	**: I**
uration	**: 3 hours**
laximum Marks	**: 75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any five questions out of Q. No. 2 to Q. No. 8.

Parts of a question must be answered together.

1. (a) Write a C++ statement using built-in function which is equivalent to the mathematical expression 5^3. 1

(b) Suppose a and b are integer variables having values 8 and 5 respectively. What will be the value of the following arithmetic expression? 1

```
cout<<2*b+3*(a-3);
```

(c) What will be the output produced on execution of the following code snippet : 1

```
int speed =5;
int x = - - speed;
cout<<x;
```

P.T.O.

(d) Write a statement in C++ that declares a 10 element character array named firstName. Also, initialize it to the empty string. 1

(e) Write statements in C++ to open a file named text1.dat in output mode and write the value of an integer variable sum having value 20. 2

(f) What will be the output produced on execution of the following code snippet :

```
intnum[2] [2] = {{3, 8, 6}, {9, 4,7}};
int a,b;
a = num[1] [2];
b = num [2] [2] ;
c=a+b;
cout<<c;
```

2

(g) Write C++ statements for the following :

(i) Declare a structure Course having two integer members as courseNo and fee.

(ii) Define and initialize a structure variable course1, for which courseNo and fee should be initialized to 301 and 5000 respectively.

(iii) Display the values of members of course1. 3

(h) Define a function product that accepts two integer numbers as input parameters and returns their product. 3

(i) What is wrong with the following code snippet? 3

```
class First
{
```

```
int a;
First(int n)
{
    a = n;
    }
};
int main ()
    {
        First obj1(1);
        return 0;
    }
```

(j) Write a C++ statement that :

(i) Declares a one dimensional array called Num of type integer.

(ii) Initializes it with marks of four subjects as 87, 69, 71 and 53.

(iii) Display total marks. 4

(k) Write C++ statement for the following :

(i) Declare a class Animal having one character array data member color.

(ii) Derive a class Type publicly from class Animal having another character array data member Breed. 4

(a) A point on the two-dimensional plane can be represented by two numbers: an x coordinate and a y coordinate. For example, (4, 5) represents a point 4 units to the right of the vertical axis, and 5 units up from the horizontal axis. The sum of two points can be defined as a new point whose x

P.T.O.

coordinate is the sum of the x coordinates of the two points, and whose y coordinate is the sum of the y coordinates. Write a C++ program that uses a structure called point to model the point. Declare three variables of the declared structure point. Accept the values of two of these variables from the user. Set the third point structure variable equal to the sum of the other two, and display the value of the new point. 6

(b) Write a C++ program using a function swap () which accepts two integer variables x and y as an argument and swaps them without using a third variable. Call this function from main( ). 4

3. (a) What will be the output produced on execution of the following code snippet :

```
int x = 10;
do{
    cout<< x <<endl;
}while(x<=10);
```

2

(b) Identify the error in the following code snippet :

```
float x = 20.2f;
switch (x) {
  case 20.1f:
      cout<< "Case 1" <<endl;
  case 20.2f:
```

```
        cout<< "Case 2" <<endl;
    case 20.3f:
        cout<< "Case 3" <<endl;
        break;
    default:
        cout« "Default" «endl;
        break;
}
```

2

(c) The following code snippet is meant to determine whether a number n is prime. When executed for n is 20; the program segment prints "Number is prime". What is the logical error in the code? Also rectify the error to make the program work correctly.

```
int n = 20;
int f = 0;
for (int i = 2; i <= n/2; i++)
{
    if (n%i = =0)
    {
        continue;
        f = 1;
    }
if (f = = 0)
        cout<< "Number is prime";
```

P.T.O.

else

cout<< "Number is not prime";

3

(d) Write a program that inputs an employee's name and salary from the user and writes it to a file. 3

4. (a) Write a C++ program that asks the user to enter the number of rows (r) and columns (c) of a 2-dimensional integer matrix A, and accepts the matrix A of order r*c from the user. Write a function to find and display row-wise the transpose of matrix A. Transpose of a matrix is a new matrix of whose rows are the columns of the original matrix. The order of the new matrix is c*r. 6

(b) Define a function reverse () that accepts a non-negative integer n as parameter and returns the number obtained by reversing the digits of n. For example, the function call reverse (234) should return 432. 4

5. (a) Create a class Product having three data members: name- that specifies name of a product, pricethat specifies price of the product, an array called sales storing number of items of the product sold in five regions. 3

(b) Create a parametrized constructor for this class that initializes the three members. 2

(c) Define member functions for the following :

(i) Displaying the values for the three members of the Product class. 2

(ii) Calculating and displaying the total sales for a product in the five regions and the amount of money earned through the sales. 2

(d) Create an object of the class that would invoke the parametrized constructor created in part (b) above. 1

5. (a) Find the errors in the following code snippet and give reasons for the same :

```
class C1{
public:
int i;
    C1 ( )
    {
        i=0;
    }
    void disp ( )
    {
        cout<< i <<"\n";
    }
protected:
    int k;
} ;
class C2 : protected C1 {
public:
```

```
    int j;
    C2 ( )
    {
        j =0;
    }
    void display ( )
    {
        cout<< j <<i <<k;
};
int main ( )
{
C2 obj;
cout<<obj.k;
cout<<obj.i;
}
```

4

(b) Write a C++ program to accept a number from the user. Call a function check ( ) to find whether this number is an Armstrong number. An Armstrong number is a number the sum of cubes of whose digits is equal to the number itself. (For example, 135 is an Armstrong number as $135 = 1^3 + 3^3 + 5^3$). The function returns 'y' in case number is Armstrong otherwise the function returns 'n'. 6

7. (a) Create a class Vehicle with the following attributes : model, year and price.

Define a member function display( ) in the class to print the values of the three attributes. The function prototype is given as :

void display ( ) 2

(b) Derive a class Car from the class Vehicle with attributes numberOfPassengers and AC(Yes/No). Define a constructor in the class Car that initializes the attributes numberOfPassengers and AC and also initializes the three attributes of the Vehicle class.

Define a member function display( ) in the class to print the values of the two attributes. The function prototype is given as :

void display ( ) 6

(c) Declare objects of both the classes in the main () function and invoke the display function for both. 2

8. (a) Declare a structure School that includes three integer variables, *viz*, rollno, age and marks. Declare a School type structure variable self. Write a C++ statement that sets rollno member of self to 11, age member to 19 and marks member to 87. 4

(b) Write a function vowelCount ( ) in C++ that accepts a character array designation as parameter from the function main ( ). The function vowelCount ( ) finds the total number of vowels in the array designation and returns this count to the function main ( ). 4

(c) What will be the output produced on execution of the following code snippet : 2

```
void MyFunction (int a, int b = 40)
{
cout<<"a =" << a <<" b " << b << endl;
}
int main ( )
{
MyFunction (20) ;
}
```

This question paper contains 4 printed pages.

Your Roll No. .....

Sl. No. of Ques. Paper	: **8299**	**J**
Unique Paper Code	: **32345301**	
Name of Paper	: **Computer Networks and Internet Technologies**	
Name of Course	: **Computer Science : Generic Elective**	
Semester	: **III**	
Duration	: **3 hours**	
Maximum Marks	: **75**	

Section A is compulsory.

Attempt any five questions from Section B.

SECTION A

1. (a) Give three differences between TCP/IP and OSI network models. 3

   (b) Assuming that ten devices are to be arranged in a mesh topology, how many cables are needed? How many ports are needed for each device? Assume that all connections are full-duplex. 2

   (c) What is Cladding? 2

   (d) Give HTML code to do the following using style tag :

   (i) set the color of heading (h1) as red

   (ii) set the color of paragraph as blue. 3

   (e) Write an HTML statement to make an image as marquee. 2

P.T.O.

(f) Give any three advantages of using CSS. 3

(g) What is an event in JavaScript? What is focus event? 2

(h) Find the output of the following code :

(i) document.write("1" + 5 + "3");

(ii) var $x = 10$;

var y = "10";

document.write(x = = =y); 2

(i) What is the difference between simplex, half-duplex and full-duplex in transmission modes? 3

(j) What is the difference bewteen Internet and Extranet? 3

SECTION B

2. (a) At what layer(s) in the OSI model do the following network devices operate :

(i) Router

(ii) Hub

(iii) Bridge

(iv) Gateway

(v) Repeater. 5

(b) Write a JavaScript program to enter the name, roll no, subject and marks of a student. If the marks > 100, display an alert box with message "Erroneous data", else the alert box should display the message "Fine". 5

3. (a) Differentiate between guided and unguided transmission media. 5

(b) Design an HTML page with two textboxes and two radio buttons named enter, number, result, square and cube respectively. Write a JavaScript code :

(i) that accepts the entered text as a numeric value from the first text box

(ii) depending upon the selected radio button, displays the output in the result box as square or cube of the number entered. 5

4. (a) What is CSS? Describe four ways of using CSS in HTML page. 5

(b) What are the parameters that affect the effectiveness of a communication system? 5

5. (a) Write a JavaScript statement to set the background color of an HTML document as red. 2

(b) Describe two attributes of form tag. 3

(c) Write an HTML code to create a window that is divided into three horizontal frames, in which first two rows are further divided into two columns and the last row is as it is as shown below : 5

<table>
<tr><td>Frame 1</td><td>Frame 2</td></tr>
<tr><td>Frame 3</td><td>Frame 4</td></tr>
<tr><td colspan="2">Frame 5</td></tr>
</table>

6. (a) What is the difference between ring and bus topologies? 4

(b) Write a code to create the following structure in HTML :

Assume that company logo is an image stored in the file abc.jpg at C:\Document\desktop. 6

P.T.O.

Invoice #123478		14 April 2024		Company Logo
Pay to : Acme Billing Co. 123, Main Street Delhi 12345		Customer : AK Singh 321, Sub Way Delhi West 110046		
Name/Desc	Qty	@	Cost	
Paperclips	100	20	2000	
Staplers	150	40	6000	
Total			8000	

7. (a) Give two services provided by each layer of the OSI model. 7

(b) Briefly describe any three attributes of table tag in HTML. 3

8. (a) What is the purpose of using :

(i) FTP

(ii) Telnet

(iii) HTTP

(iv) m-Commerce. 2×4=8

(b) Give one advantage and one disadvantage of Wireless LAN network over wired network. 2

This question paper contains 8+2 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **7125**

Unique Paper Code : **62347502** **J**

Name of the Paper : **Programming with Python**

Name of the Course : **B.A. (Programme) Computer Application DSE-1**

Semester : **V**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. **1** is compulsory.

Attempt any **5** of Question Nos. **2** to **8**.

All parts of a question must be answered together.

Due credit will be given to the structure and documentation of the code. For every program/function you must include as comments the following :

Objective :

inputs/input parameters :

outputs/output parameters :

P.T.O.

1. (*a*) For each of the following, indicate whether it is a valid Python keyword. 2

(*i*) `class`

(*ii*) `not`

(*iii*) `if`

(*iv*) `exec`

(*b*) How does the effect of the following two statement differ ?

(*i*) `a -= a - 3`

(*ii*) `a = a - 3`

(*c*) Give the output that will be produced on execution o the following code segment :

```
s1 = "learning python is FUN!!"
s2 = s1.capitalize()
s3 = s1.title()
print(s2)
print(s3)
```

(d) Consider a queue q. Write a Python function display() that displays content of queue q if queue is not empty, otherwise, it displays the message "Queue is Empty". 2

(e) Identify error(s), if any, in the following code segment : 2

```
s1 = "I am a String"
s1[4] = "not"
print("String s1 is, " + S1)
```

(f) Give the output that will be produced on execution of the following code segment : 3

```
f = 10
m = 4
for i in range(f, 0, -1):
    p = m * i
    print(p)
```

P.T.O.

(*g*) Give the output that will be produced on execution of the following code segment : 3

```
v = 5
def sum(n1, n2):
    v = n1 + n2
    print("v inside sum: ", v)
print("v before sum:", v)
sum(7, 3)
print("v after sum:", v)
```

(*h*) Write a Python function `factors(x)` that takes an integer value `x` and find factors of `x`. 4

(*i*) Give the output that will be produced on execution of the following code segment : 5

```
list1 = [1.32, 2.45, 6.13, 3.65, 8.42, 5.26]
list1.remove(6.13)
print(list1)
print(list1.index(3.65))
list1.insert(3,9.24)
print(list1)
print(list1.pop())
print(list1[1:4:2]
```

2. Define a class Item that keeps record of items available in a shop. The class contains two data members `name` and `quantity` that stores name and available quantity of an item in the shop. Define the constructor for this class to create an object with given `name` and `quantity`. Define methods `update` and `display`. The method `update` modifies the available quantity of the item. It the item is purchased, quantity is increased by the number of units purchased and if item is sold, quantity is decreased by the number of units sold. The method `display` prints the item information. 10

3. (*a*) Define a function `insertionSort(list1)` which accepts a list `list1` as an input argument and sorts the list using insertion sort. 6

(*b*) Illustrate the operation of the `insertionSort(list1)` function defined in part (a) on the following list by showing how the list would appear at the end of each iteration : 4

```
[24, 35, 6, 15, 82, 49].
```

4. (*a*) Write a python function `searchKey(lst,k)` for searching an item `k` in the list `lst` of `n` integers using binary search. The function should return the index of the item `k`, if `k` is present in the list, otherwise, it should return `-1`. 6

(*b*) Translate each of the following mathematical expressions into an equivalent Python expressions : 4

(*i*) $b\ (c + d^3) / 3$

(*ii*) $z(6+3z) + x(5-x)/y$

5. (*a*) Identify error(s), if any, in the following code segment : 2

```
def test(a, b):
    a[1] = 'T'
    b[1] = 'j'
x = 'this'
y = ['m', 'n', 'o']
test(x, y)
print(x, y)
test(x, y[:])
print(x, y)
```

(*b*) Give the output that will be produced on execution of the following code segment : 4

```
l1 = ['P', 'Q', 'R']
l1.append('O')
print(l1)
print(l1.pop(1))
del l1[1]
print(l1)
```

(*c*) Give the output that will be produced on execution of the following code segment : 4

```
a = 16  # 16 in binary: 0001 0000
b = 8   # 8 in binary: 0000 1000
a = a ^ b
print(a, b)
b = b << 3
print(a, b)
a = ~b
print(a, b)
a = a & b
print(a, b)
```

6. (*a*) Consider a stack `s` of integers that is initially empty. Perform the following operations in sequence on the stack `s` and show the modified stack `s` (using a diagram) after each of the following operations : 5

(*i*) push 18

(*ii*) pop

(*iii*) push 7

(*iv*) push 5

(*v*) pop.

(*b*) Evaluate the following expressions : 5

(*i*) `2 ** 2 ** 3`

(*ii*) `not 10 == 8 and 6+3 != 9`

(*iii*) `6 ** 2 // 12 % 4`

(*iv*) `'list' > 'List'`

(*v*) `12 / 6 /`

7. (*a*) Write a Python program that takes a positive integer `n (n < 9)` as input from the user and produces

an n lines pattern as output. For example, when 5 is entered as the value of n, the output will be as follows : 5

```
55555
4444
333
22
1
```

(*b*) Give the output that will be produced on execution of the following code segment : 5

```
str1= 'We are learning python'
print(str1.split())
print(str1.capitalize())
print(str1.count('n'))
print(str1.swapcase())
print(str1.title())
```

P.T.O.

8. (*a*) Write a Python function `checkVowel(ch)` that accepts a character argument `ch`. The function `checkVowel` checks whether character `ch` is a vowel. The function `checkVowel` returns true if given character `ch` is a vowel, otherwise returns false. 5

(*b*) Write a segment of the Python code to find the sum of the `n` terms of the series given below. The input `n` is to be entered by the user at run time. 5

$$1 - 2 + 3 - 4 + 5 - 6 + \ldots + n$$

This question paper ...

Your Roll No. .....

Sl. No. of Ques. Paper	: 7193	J
Unique Paper Code	: 62343318	
Name of Paper	: Office Automation Tools	
Name of Course	: B.A. (Prog.) Computer Applications : SEC	
Semester	: III	
Duration	: 2 hours	
Maximum Marks	: 25	

Section A is compulsory.

Attempt any ***three*** *questions from Section B.*

Parts of a question must be answered together.

SECTION A Marks : 10

1. (a) What are the two types of Page Orientations available in any Word Processing Software?

   (b) Which among the following is **not** a valid font style in any Word Processing Software?

   (i) Bold (ii) Italic

   (iii) Regular (iv) Subscript

   (c) Which among the following is **not** a valid datatype in Spreadsheet?

   (i) Number (ii) Character

   (iii) Label (iv) Date/Time

P.T.O.

(d) How are data organized in Spreadsheets?

(i) Lines and Spaces

(ii) Layers and Planes

(iii) Rows and Columns

(iv) Height and Width

(e) In Spreadsheet, the shortcut Ctrl+Home takes you to :

(i) Beginning of Page (ii) Cell A1

(iii) Beginning of Row (iv) Cell 1A

(f) What cell in the same row comes after cell Z1?

(i) AA1 (ii) ZA1

(iii) Z2 (iv) A2

(g) What is the term given to intersection of a row and a column in Spreadsheet?

(h) Which function in Spreadsheet is used to find the number of numeric entries in a selection?

(i) Which of the following functions is used to find largest element?

(i) MAXIMUM(A1 : A3)

(ii) MAX(A1 : A3)

(iii) LARGEST(A1 : A3)

(iv) HIGHEST(A1 : A3)?

(j) What are Superscript, Subscript, strikethrough called?

Section B

2. What is Mail Merge? Explain in detail all the steps required to perform mail merge in any Word Processing Software. 5

3. (a) Explain two ways of creating a table having 3 rows and 2 columns in any Word Processing Software.

(b) What are the different types of alignments in any Word Processing Software. 5

4. (a) What is a Cell in context of Spreadsheets? Explain the various ways of addressing a cell giving example of each.

(b) What is advantage of using Pivot Table giving example? 5

5. Explain the following functions :

(a) IF

(b) AVERAGE

(c) COUNTIF

(d) SUM

(e) VLOOKUP 5

6. Consider this Spreadsheet to answer the following :

	A	B	C	D	E	F	G
1	Roll No.	Name	Marks1	Marks2	Sum	Percentage	Result
2	1	A	34	23			
3	2	B	23	45			
4	3	C	56	43			
5	4	D	78	56			
6	5	E	49	44			

Write the formula/function to :

(a) Calculate percentage in cell F2 (Marks are out of 100)

(b) Calculate result in cell G2, if pass criteria is 50%

P.T.O.

(c) Find result of student whose Roll No. is 4

(d) Write both formula and function to calculate sum of marks 1 and marks 2. 5

This question paper contains 8+2 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **2214**

Unique Paper Code : **62273506** **JC**

Name of the Paper : **Data Analysis (Skill Enhancement Course)**

Name of the Course : **B.A. (Programme) (CBCS)**

Semester : **V**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Note :— Answers may be written *either* in English *or* in Hindi but the same medium should be used throughout the paper.

टिप्पणी :—इस प्रश्न-पत्र का उत्तर अंग्रेजी **या** हिन्दी किसी एक भाषा में दीजिए; लेकिन सभी उत्तरों का माध्यम एक ही होना चाहिए।

All questions carry equal marks (**15** marks each).

Attempt any *five* questions.

Use of simple calculator is allowed.

सभी प्रश्नों के अंक समान हैं (प्रत्येक **15** अंक)।

किन्हीं **पाँच** प्रश्नों के उत्तर दीजिये।

साधारण कैलकुलेटर का उपयोग किया जा सकता है।

P.T.O.

1 (*a*) Describe the various methods of collecting primary data and comment on their relative advantages.

(*b*) Define the following terms :

(*i*) Random sample

(*ii*) Histogram

(*iii*) Critical region

(*iv*) Probability density function. 5+10

(अ) प्राथमिक आँकड़ों के संग्रहण में विभिन्न विधियों का विवेचन कीजिये तथा इसके सापेक्षिक लाभों पर टिप्पणी कीजिये।

(ब) निम्नलिखित शब्दों का विश्लेषण कीजिये :

(*i*) दैव नमूना

(*ii*) हिस्टोग्राम

(*iii*) त्रुटिपूर्ण क्षेत्र

(*iv*) प्रायिकता घनत्व फलन।

2. (*a*) What are the advantages and disadvantages of Arithmetic Mean and Geometric Mean ?

(*b*) Find the missing frequency in the following frequency distribution, when it is known that Arithmetic mean = 11.09 and total number of observations is 60.

Class Limits	Frequency
9.3–9.7	2
9.8–10.2	5
10.3–10.7	X
10.8–11.2	Y
11.3–11.7	14
11.8–12.2	6

5+10

(अ) अंकगणितीय माध्य एवं ज्यामितीय माध्यम के गुण तथा अवगुण क्या हैं?

(ब) निम्न बारंबारता वितरण में लुप्त बारंबारता को ज्ञात कीजिये जब यह जाना जाता है कि अंकगणितीय माध्य = 11.09 तथा अवलोकनों की संख्या 60 है।

Class Limits	Frequency
9.3–9.7	2
9.8–10.2	5
10.3–10.7	X
10.8–11.2	Y
11.3–11.7	14
11.8–12.2	6

3. (*a*) What do you mean by index number ? State the uses of index number. 5+10

(*b*) Calculate Laspeyres' index using the following data. Does it satisfy the time reversal test ?

Commodities	Price (Rs.) 1979	Quantity 1979	Price (Rs.) 1980	Quantity 1980
Rice	32	50	30	50
Barley	30	35	25	40
Maize	16	55	18	50

(अ) निर्देशांक सूचकांक से आप क्या समझते हैं? निर्देशांक सूचकांक के उपयोग का विश्लेषण कीजिये।

(ब) निम्न आंकड़ों का उपयोग करते हुए लैस्पेरे सूचकांक की गणना कीजिये। क्या यह समय व्युत्क्रमण जाँच को संतुष्ट करता है ?

Commodities	Price (Rs.) 1979	Quantity 1979	Price (Rs.) 1980	Quantity 1980
Rice	32	50	30	50
Barley	30	35	25	40
Maize	16	55	18	50

4. (*a*) What do you understand by linear regression analysis and correlation analysis ? How do they differ ?

(*b*) Find the coefficient of correlation from the following data :

X	Y
65	68
63	66
67	68
64	65
68	67

P.T.O.

62	66
70	68
66	65

8+7

(अ) रेखीय प्रतीपगमन विश्लेषण एवं सहसंबंध विश्लेषण से आप क्या समझते हैं ? ये एक दूसरे से कैसे अलग हैं ?

(ब) निम्न आंकड़ों से सहसंबंध गुणांक की गणना कीजिये :

X	Y
65	68
63	66
67	68
64	65
68	67
62	66
70	68
66	65

5. (*a*) What do you understand by Dispersion ? Explain briefly the various methods used for measuring dispersion.

(*b*) The coefficients of variation of wages of male workers and female workers are 55 per cent and 70 per cent respectively, while the standard deviations are 22 and 15.4 respectively. Calculate the overall average wages of 100 workers given that 80 are male and 20 are female workers. 10+5

(अ) प्रसरण से आप क्या समझते हैं? प्रसरण की माप के लिए उपयोग की गई विभिन्न विधियों का संक्षेप में विवेचन कीजिये।

(ब) पुरुष मजदूर एवं महिला मजदूर के मजदूरी के वितरण का गुणांक क्रमश: 55 प्रतिशत तथा 70 प्रतिशत है, जबकि प्रमाप विचलन क्रमश: 22 तथा 15.4 है। 100 मजदूरों की कुल औसत मजदूरी ज्ञात कीजिये जबकि 80 पुरुष एवं 20 महिला मजदूर दिये गये हैं।

P.T.O.

6. (*a*) What is skewness ? Explain the main types of skewness curves.

(*b*) Find the First, Second, Third and Fourth moment about its original mean and arbitrary origin 4 for the set of numbers 2, 3, 7, 8, 10. 5+10

(अ) विषमता (skewness) क्या है? विषमता (skewness) वक्र के विभिन्न प्रकारों की व्याख्या कीजिये।

(ब) संख्याओं के समुच्चय 2, 3, 7, 8, 10 के लिए इसके मूल्य माध्य एवं काल्पनिक मूल 4 से प्रथम, दूसरा, तीसरा तथा चौथा आघूर्ण ज्ञात कीजिये।

7. (*a*) If the probability of a defective bolt is 0.2, find the mean and standard deviation of defective bolts in total of 900 bolts.

(*b*) (*i*) Explain the concept of conditional probability.

(*ii*) An insurance company insured 2,000 scooter drivers, 4,000 car drivers and 6,000 truck drivers. The probability of their insurance is 0.1, 0.3 and 0.2 respectively. One of the insured persons meets with an accident. What is the probability that he is a car driver ? (Using Bayes' Theorem) 9+6

(अ) यदि एक खराब बोल्ट की प्रायिकता 0.2 है, तो कुल 900 बोल्टों में से खराब बोल्टों के लिए माध्य तथा प्रमाप विचलन ज्ञात कीजिये।

(ब) (*i*) सशर्त प्रायिकता की अवधारणा की व्याख्या कीजिये।

(*ii*) एक बीमा कंपनी ने 2,000 स्कूटर ड्राइवर, 4,000 कार ड्राइवर तथा 6,000 ट्रक ड्राइवर को बीमा दिया। इनके बीमा की प्रायिकता क्रमशः 0.1, 0.3 तथा 0.2 है। बीमित व्यक्ति में से एक की दुर्घटना हो जाती है। क्या प्रायिकता है कि यह एक कार ड्राइवर है (बेज प्रमेय का उपयोग कीजिये।)

8. (*a*) (*i*) Define Binomial distribution.

(*ii*) Arithmetic mean and standard deviation of a binomial distribution are respectively 4 and $\sqrt{8/3}$. Find the values of n and p.

(*b*) A random variable X is defined as the sum of faces when a pair of dice is thrown. Obtain the probability distribution of the sum of the number on them. Find the expected value of X. 10+5

(अ) (*i*) द्विघाती वितरण को परिभाषित कीजिये।

(*ii*) एक द्विघाती वितरण का अंकगणितीय माध्य तथा प्रमाप विचलन क्रमशः 4 तथा $\sqrt{8/3}$ हैं। n तथा p का मूल्य ज्ञात कीजिये।

(ब) एक दैव चर X अभिमुख के योग के रूप में परिभाषित है जब पांसे का एक जोड़ा फेंका जाता है। उन पर संख्या के योग का प्रायिकता वितरण ज्ञात कीजिये। X का प्रत्याशित मूल्य ज्ञात कीजिये।

This question paper contains 4 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : 7216

Unique Paper Code : 62343502 J

Name of the Paper : Open Source Software

Name of the Course : B.A. (Prog.) Computer Applications : Skill Enhancement Course

Semester : V

Duration : 2 Hours Maximum Marks : 25

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any *three* questions from the remaining five questions.

1. (*i*) GAMBAS responds to events using ..... 1×10

(*a*) a code procedure (*b*) an event procedure

(*c*) a form procedure (*d*) a property

P.T.O.

(*ii*) What value will be assigned to the numeric va when the following statement is executed ?

```
X = 2 + 3 * 4 ^2
```

(*a*) 10 (*b*) 146

(*c*) 50 (*d*) 400

(*iii*) Variable declaration is done using the ..... keyword.

(*a*) Var (*b*) Dim

(*c*) Declare (*d*) Static

(*iv*) Variables declared inside a procedure are have .....

(*a*) local scope (*b*) procedure-lev

(*c*) class-level scope (*d*) global scope

(*v*) Keywords are also referred to as :

(*a*) reserved words (*b*) variable nam

(*c*) constant name (*d*) user defined

(*vi*) .....tool allows drawing with free-hand

(*a*) Text (*b*) Lasso

(*c*) Fuzzy selection (*d*) Bucket fill

(vii) Shift + C is the shortcut to ..... an image in GIMP.

(a) duplicate (b) cut

(c) copy (d) crop

(viii) GIMP is covered by .....open source software license.

(a) GPL (b) LGPL

(c) Mozilla (d) BSD

(ix) .....is the file extension of a GIMP project file ?

(a) PSF (b) XCF

(c) XOF (d) PCF

(x) What will happen if GIMP image is bigger than the image window ?

(a) Image resize dialog box appears

(b) GIMP displays the image in a reduced zoom level

(c) Error message is shown

(d) Image is not displayed

2. (*a*) Highlight three features of MIT License. 3

(*b*) What do you understand by "generational limitation" principle in open source software licensing ? 2

3. (*a*) What do you mean by open source software ? 2

(*b*) Explain *three* disadvantages of open source software. 3

4. Explain *five* open source definitions propounded by Open Source Initiative. 5

5. (*a*) How is LGPL different from GPL ? 3

(*b*) Differentiate between Contributor and Licensor of an open source software. 2

6. (*a*) Explain three limitations of copyright. 3

(*b*) List *four* popular open source softwares with their application areas. 2

This question paper contains 4 printed pages]

41475

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : 7256

Unique Paper Code : 62345501 J

Name of the Paper : IT Fundamentals

Name of the Course : B.A. (Prog.) : Computer Application : G. E.

Semester : V

Duration : 3 Hours Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Answer any *five* questions from the section B.

Section A

1. (*a*) Differentiate between guided and unguided transmission media. 4

(*b*) What are registers in a CPU ? Name any *two* registers. 3

(*c*) Differentiate between RAM and ROM. 3

P.T.O.

(*d*) Name any *four* pointing devices used to cor
a computer system.

(*e*) Explain different types of data transmissi
a suitable example.

(*f*) Define the following terms :

Web page, home page and website

(*g*) What do you mean by time sharing ope

(*h*) Differentiate between peer-to-peer an
network.

(*i*) What do you understand by a primary ke
management system ? Explain with
example.

Section B

2. (*a*) What do you mean by the cache mem
different levels of cache memory.

(*b*) Explain the various units of a Central P

3. (*a*) Differentiate between impact and non-impact printers w the help of *one* example each.

(*b*) What do you understand by URL ? Explain its structu

4. (*a*) Describe how the different types of memories a organized in the hierarchy in a computer system.

(*b*) Describe the basic organization of a computer system, a explain the functions of various units of a compu system.

5. (*a*) List and explain the different components of a datab management system.

(*b*) Describe any *five* benefits of database management syste

6. (*a*) Differentiate between :

(*i*) Download and upload

(*ii*) Online and offline

(*b*) Describe any *three* applications of Internet.

7. (*a*) List and explain any *five* functions of an operat system.

(*b*) Write short notes on :

(*i*) Real-time operating system

(*ii*) Scanners 5

8. (*a*) What is data communication system ? Explain its components. 7

(*b*) List and explain the different types of browsers with the help of suitable example used in internet 3